

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000200010004-4

**29 OCTOBER 1979**

**(FOUO 13/79)**

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JPRS L/8735

29 October 1979

# USSR Report

TRADE AND SERVICES

(FOUO 13/79)



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USSR REPORT  
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INTERNATIONAL ECONOMIC RELATIONS

USSR DECLARES ACCEPTANCE OF TECHNICIANS; ON DEVELOPMENT OF SOUTH YAKUT

Tokyo YOMIURI SHIMBUN in Japanese 14 Sep 79 p 3

[Text] According to what was disclosed by iron and steel circles on the 13th, at the 4th periodic consultations, which were held in Tokyo from the 10th to the 12th as to the development of South Yakut coal, the Soviet side showed that the development plan is progressing smoothly, and also replied that they are ready to receive the dispatch of expert technicians from the Japanese side to the said district in the USSR this December. Also, the Soviet side requested a supplementary loan amounting to \$40,000,000 in order to construct coal-dressing plants, etc. In connection with the financing, it will be worked on among banks from now on, but the iron and steel business world hopes that the shipping of raw material coal to Japan will start from 1983 as scheduled.

This development plan is a large-scale enterprise whereby a total of 84,400,000 tons (3,200,000 tons in 1983, 4,200,000 tons in 1984, and 5,500,000 tons each from and after 1985) of raw material coal for iron and steel will be shipped to Japan from 1983, for 16 years.

At the talks held this time, they confirmed that supply of 97 percent of the facilities and machinery and 100 percent of the consumer goods among the contracts as to supply to the USSR has been finished so far. The Soviet side (1) has completed the construction of a railroad reaching a length of 229 kilometers in total for loading and shipping of coal, and will start full operation within this year, and (2) in the coalfields, they switched to full-scale construction of strip mines from this year, etc. Thus, the Soviet side emphasized that these projects have progressed according to plan with few changes, as to the development of the coalfields. Also, the Soviet side expressed its intention of receiving the dispatch of Japanese technicians, toward which they initially showed disapproval.

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MANPOWER: LABOR, EDUCATION, DEMOGRAPHY

IMPROVING EFFICIENCY OF LABOR RESOURCES USE

Labor Deficit Minimal in Omskaya Oblast

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in  
Russian No 8, Aug 79 pp 153-154

[Article by Candidate of Economic Sciences Yu. M. Chernikov, docent at Omsk  
State University: "Is the Deficit Great?"]

[Text] ...Kemerovskaya Oblast is short 12,000 to 15,000 workers each year.<sup>1</sup>

...This five-year plan, Krasnoyarskiy Kray has 76,000 fewer workers than it  
needs.<sup>2</sup>

These figures apparently testify to the extent of the manpower deficit. But  
a detailed analysis enables us to view the problem in a different light. Let  
us turn to relative values. Thus, according to the testimony of various in-  
dustrial ministries and departments, the shortage of labor resources in the  
RSFSR is about 10 percent.<sup>3</sup> In Omskaya Oblast, the declared understaffing  
is seven percent of all industrial-production personnel and 2.5 percent of  
all workers.

These indicators are refined (and reduced!) even further if statistics are  
brought in. Thus, according to data from the Omskaya Oblast Statistical Ad-  
ministration, understaffing as against the planned number of workers (which  
was probably overstated, rather than understated) as of early 1977 was noted  
in only four branches and in only insignificant amounts: 0.1 percent of the  
workers in machine building (employing 56.5 percent of oblast personnel in

1. See: KOMMUNIST, No 1, 1976, p 22.

2. "Vosproizvodstvo trudovykh resursov i ikh ispol'zovaniye" [Labor Re-  
sources Use and Reproduction], Moscow, Izd-vo Mysl', 1976, p 122.

3. Ye. G. Antosenkov and Z. V. Kupriyanova, "Tendentsii v tekuchesti ra-  
bochikh kadrov" [Trends in Worker Personnel Turnover], Novosibirsk, Izd-  
vo Nauka, 1977, pp 244-245.

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manufacturing), and 0.4 percent of workers in fuel industry. The maximum deficit of two percent was noted in light and food industry, employing 15.3 percent of all workers.

Several indirect indicators also cast doubts on the deficit. According to annual statistical administration summaries on annual plan fulfillment, the number of enterprises not meeting the plan in terms of labor productivity growth is several times higher than the number not meeting the plan in terms of output sales volume. Thus, in 1977, eighteen enterprises of Omskaya Oblast failed to meet the sales plan and 62 the labor productivity growth plan. This means failure to meet assignments in terms of the latter indicator was covered by increasing the number of personnel.

The deficit becomes even less if personnel turnover is reduced and labor discipline is strengthened. The industrial worker turnover level in Omskaya Oblast was several-fold less than the union average. But still, an appreciable portion of the workplaces, and consequently of the production program in industry as well, was susceptible to the influence of turnover. Total labor losses due to turnover in the oblast were 1.0 to 1.5 percent. The status of labor discipline is not satisfactory either. One in every nine workers was absent without permission in Omskaya Oblast industry in 1976, and one in every five in construction. The labor reserve here is about 1.5 percent.

Thus, direct losses of labor potential due to turnover and absenteeism, not to mention intrashift idle time, are 2.5 to 3.0 percent, that is, close to the above-indicated shortage of worker personnel declared by enterprises at the labor department of the Omskaya Oblast ispolkom.

It can be stated with confidence that Omskaya Oblast is no exception.

One practical step to eliminate losses is to improve labor department activity. These departments are having an increasingly appreciable impact on interplant worker movement and are comprehensively analyzing interbranch and territorial-occupational manpower problems. The activity of the Omskaya Oblast ispolkom labor department can be evaluated from these brief data. In 1976, 20.7 percent of all those hired at industrial enterprises and construction projects were placed through its bureaus. The average job placement time was reduced from 25-30 days to nine days. The proportion of those placed through the bureaus in 1971-1976 who were skilled workers increased from 50.4 to 63.3 percent. These results were achieved through the efforts of bureaus employing about 40 persons.

One other practical step has been the transfer of personnel work to the newest scientific-technical basis. Thus, the "Omsknefteorgsintez" association has created, using an "YeS-1020" computer, a bank of detailed sociological information on all workers, with daily additions and up-dating. This makes moving on to the next qualitative stage, developing the "Kadry" [personnel] automated control system, feasible.

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Impact of Bonuses on Labor Discipline

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in  
Russian No 8, Aug 79 pp 155-158

[Article by N. V. Kozlov, Scientific Research Institute of Labor, Moscow:  
"Not Stumbling Over the 'Threshold of Perception' of Incentives"]

[Text] How will a worker respond to a particular amount of reward or the way it is offered? By answering these questions, we can properly determine the size of a bonus and the time for paying it. And we are being helped more and more in this by sociologists studying the so-called "thresholds of perception" of incentives.

It must be said that insufficient attention is being paid, in our view, to studying "thresholds of perception." Certain assertions are therefore in the nature of expert appraisals. Let's say it is thought a person will respond to a bonus of 10 rubles or more, but will remain indifferent to a bonus of 9 rubles 50 kopecks or less. There is little data on the effect of moral incentives, of the "climate" in the collective, on "thresholds of perception." But sociologists have already accumulated quite a few interesting observations.

If only material incentives are examined, it can be asserted that a worker's labor efforts (intensiveness of labor) are determined by the amount of reward and the length of time it is anticipated. When payments are increased, labor efforts grow; as the time of anticipation increases, they decrease. More must be paid for waiting, or it will be impossible to retain effort at the previous level.

This concept has been confirmed in research on the influence of the system of withdrawing bonuses for reducing violations of labor discipline, which was conducted in 1975-1977 at the Moscow Hydraulic Tractor Parts Plant.

Violations of discipline at the plant were accompanied by quite a substantial material punishment: the material loss to the worker for one absenteeism, for example, might reach 60-70 percent of the monthly piece-rate wage (sometimes the violator was deprived of all monthly bonuses and half the award based on the results for the year). Still, discipline violations remained high. This fact undermines our faith in the effectiveness of material incentives, but in fact it can easily be explained in terms of "thresholds of perception."

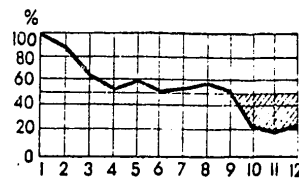
The effect of punishment like (full or partial) deprivation of rewards based on results for the year reveals itself in a reduction of the proportion of first violations of labor discipline towards the end of the year. This is to be explained by the fact that the closer payment is more tangible than the more remote; towards the end of the year, the probability that the worker will receive this additional reward increases, which forces him to restrain himself from such violations. The proportion of repeated violations also decreases somewhat towards the end of the year, since they still fall under punishment by the ruble. But then the proportion of those violations which



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are not punished materially (inasmuch as all possible material punishments of these persons had already been used for preceding violations) increase towards the end of the year.

**Dynamics of Proportion of First Violations of Labor Discipline in the Total Number of Violations, By Month**



Let us examine the nature of change in the structure of violations of labor discipline during the course of the year. The chart depicts the curve of the proportion of first violations. It can be broken down into three segments. The first 2-3 months of the year, the proportion of first violations drops sharply, from 100 to 50-60 percent (at the start of the year, all violations are first violations). Then the curve remains at the 50-60 percent level for six to seven months. An analysis of the distribution of workers by number and seriousness of violations permitted by them shows that 50 percent of the people permit an average of one violation per year. The proportion of first violations in each month should be approximately that. However, during the last three months of the year, it drops to 20 percent, that is, appreciably below the level expected to result from the random nature of the process.

It is interesting that, according to enterprise administration estimates, 20 percent of the people detected in violation of labor discipline could not be termed undisciplined, but more or less accidentally are numbered among the violators. The system of depriving workers of bonuses has no particular impact on such violations, which means the curve of initial violations can be considered to have dropped to its minimum level three months prior to the end of the year. The gap between actual and anticipated levels of initial violations curves demonstrates the effectiveness of the existing system of withholding bonuses if discipline is not followed.

The violations prevented are shown in the shaded portion of the drawing. Calculations show that the system of withholding bonuses forestalls approximately 30 percent of the potential violations of discipline in the last three months of the year (nine percent of potential violations for the year)<sup>1</sup> when applied to rewards based on results for the year. Thus, the system of withholding bonuses when applied to rewards based on results for the year is effective only in the three months prior to payment of the bonus. And

1. The potential number of violations is defined as the number anticipated on the assumption that there is no system of punishment in effect.

those three months comprise a "temporary threshold" of bonus perception for a bonus of 60 percent of the monthly piece-rate wage, and exceeding the actual time of reward anticipation above this threshold lowers the effectiveness of withholding the bonus.

There are two ways of attaining the "threshold of perception": increase the amount of reward, or increase the frequency of the reward. Of course, the second way is more economical, since it enables one to relinquish expenditures on additional payments in anticipation of the reward. It is therefore natural to place the function of averting violations of discipline on withholding bonuses within the monthly bonus framework. Such bonus withholding actually exists, but were it to have a perceptible influence on reducing violations, at the end of the year we would not find the reduction in violations shown in the drawing. The low effectiveness is evidently to be explained by the fact that the monthly bonus at a given enterprise (10 percent of the piece-rate wage) is below the "threshold of perception" of a reward in this amount.

Let us determine the approximate amount of monthly bonus the probable deprivation of which would prevent the maximum number of violations of discipline. If a violator of discipline is deprived of 60 percent of the bonus not later than three months after the violation (quarterly awarding and withholding of bonuses), that would prevent each month as many violations as the reward based on results for the year prevents in the final three months of the year, that is, the number of violations of discipline would be reduced by 13.5 percent. Monthly withholding of bonuses permits reducing the minimum bonus amount by saving additional payments in anticipation of the reward. If it is assumed that there is a directly proportional link between the amount of the reward and the time it is anticipated, the minimum monthly bonus amount sufficient to forestall the indicated number of violations is 30 percent.

It is also appropriate to change the role of rewards based on results for the year. The amount of such rewards is determined by the worker's contribution to enterprise overall work results. It is differentiated as well by length of employment at the given enterprise, in order to reduce personnel turnover. However, attention is called to the fact that the contingent of potential "turnovers" consists nearly entirely of violators of labor discipline, who receive no annual reward anyway. Thus, those receiving annual rewards generally do not intend to leave; those whom this reward is intended to restrain from leaving do not receive it. It follows from the above that it is appropriate to deprive of rewards based on results for the year only those persons who have violated discipline in the last three months of the year.

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Financing Efforts of Inventors

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in  
Russian No 8, Aug 79 pp 158-159

[Article by Yu. N. Lachinov, senior associate at the USSR Ministry of  
Finance's Scientific Research Institute of Finance: "Inventors' Development  
Bonds"]

[Text] Prior to the practical introduction of the new methods,<sup>1</sup> evaluating  
the economic impact of new techniques, inventions and efficiency proposals  
was not properly organized. Thus, it was not entirely clear what the sources  
were of funds for paying bonuses and awards to developers and inventors. In  
practice, it was easiest to include incentive funds in the estimated cost of  
the development, thus increasing that cost. This situation continues today.

The long lead times of many developments, when actualization of the proposed  
impact begins after 2-5 years or longer, explains why they must be stimulated  
in advance. Such stimulation does little to interest the developer in achiev-  
ing the greatest actual final impact, in reducing lead times, and incentives  
based on calculated impact lean towards exaggerating the anticipated impact.

On the other hand, encouraging workers based on end work results, for impact  
actually received by the consumer, was complicated by the fact that the ac-  
tual return on a development introduced by a customer sometimes emerged only  
after 3-4 years. During that time, the personnel of the developing organi-  
zation might have been renewed so often that there would be no one to en-  
courage.

Inventors' development bonds might be used to encourage developers based on  
actual final impact. Under these bonds, it is proposed that an inventor's  
reward be paid within a certain period of time, as the calculated impact of  
introducing his development is actualized.

Bonds of different face values, depending on the degree to which associates  
participate in the developments, must be issued them, let's say, upon com-  
pletion of each job or, in the case of long-term developments, by individual  
major stages. Notification of the start of payments under these bonds should  
be published in special bulletins. Bond payments should be made through  
banking institutions and savings banks. As opposed to ordinary inventors'  
bonds, these should be payable to the person named, that is, not saleable  
or transferrable to another person.

The proposed system of incentives might yield the following results. On the  
one hand, by being motivated to "pay off" the bonds as quickly as possible,  
developers would be interested in reducing the time involved in their work  
and in introducing the developments as quickly as possible into production,  
as well as in limiting the number of co-authors brought in. This might be  
reflected positively in the rates of technical progress.

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On the other hand, any tendency to rush things would be restrained by the necessity for careful calculations and well thought-out individual development factors so that the final impact of new equipment would be actual and as reliable as possible, for the size of the bond payment would depend on the realistic, actual return, on the actual impact of each development.

Finally, this system would force the customer to calculate more precisely the realistic impact of new equipment and would strengthen the link between the reward and the end results of scientific-production activity.

Moreover, the time between the start of a development and the beginning of bond payments would provide an opportunity for creating the material provision of the monetary award.

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#### Using Pensioners in Industry

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 8, Aug 79 pp 160-162

[Article by engineer E. S. Yarin, Altayskiy Tractor Plant imeni M. I. Kalinin, Rubtsovsk: "Industry Needs the Experience of Retirees"]

[Text] On the one hand, we have a manpower deficit which is becoming increasingly aggravated, and on the other, we have several tens of millions of retirees, many of whom could continue working in social production if only they wanted to. Is this reserve being used? Only in part. Especially little of it is being used in industry. For example, workers of retirement age comprise only 2.6 percent of the workers at the Altayskiy Tractor Plant production association.

The idea has evolved that the labor of retirees can be used primarily in the services sphere and it is apparently for that reason that work on drawing them to manufacturing enterprises has been insufficiently purposeful. But this is a mistaken idea. In fact, the labor of retirees cannot be recommended for the basic operations, especially in mass production, in which the work tempo is high. But there are other jobs at which the work is no harder or more strained than in the services sphere, trade or public catering, as for example among warehouse workers at a majority of material and technical supply warehouses, tool distributors, job timers, machinery attendants, technical control department inspectors, and others. Up to 10-12 percent of the workers at a large machine-building enterprise are employed at such jobs.

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Unfortunately, it is young people, often those arriving at the enterprise for the first time, who are sent to such jobs in a majority of instances. They have, of course, taken a certain course of training. But, being inexperienced and not knowing production needs, young people are by no means always capable of working at these jobs with high efficiency. Retirees could get in touch with the basic workers considerably easier and provide them with prompt, high-quality service.

The labor of persons of retirement age could be applied effectively to production jobs requiring great skill but not associated with great physical strain or a forced tempo, as for example, in manufacturing complex technological equipment, prototypes of new machinery, and so forth. Such jobs are often done by experienced specialists, together with less-qualified workers, the specialist acting as the supervisor and tutor of the other.

It has become necessary to make appropriate adjustments in enterprise personnel policies. Sociological research has shown that after retirement age is reached, it is ordinarily those who have not stopped working who can continue working successfully; it is considerably harder for a retiree to return to an enterprise after a break, especially a long one. Under the current provisions, an enterprise is obligated to prepare all the necessary documentation and register approval of a pension in the social security department for each worker reaching retirement age. The department's concern for those who have earned the right to rest because of many years of labor is usually limited to this. But that is no longer sufficient. It would be appropriate to entrust to the personnel service and the shop administrations the job of finding work for those workers reaching retirement age if they express a desire to obtain work they are capable of doing.

This concern is not so simple as might appear at first glance, since the planned nature of shifting manpower within the enterprise must be strengthened in order to resolve it. Therefore, questions of using the labor of workers of retirement age more fully and efficiently should be anticipated in the collectives' social development plans. It is necessary to reveal, in drawing up these plans, the jobs and workplaces at which the labor of retirees could be used.

Retirees are granted the right to work a partial day, which makes it easier to involve them in labor. The sectors in which such work schedules can be permitted should also be outlined in the plan. It seems to us that a reduced workday should be used first of all to keep in production highly skilled workers who have reached retirement age.

It is desirable to organize special consultations with physicians, including specialists in gerontology, to obtain comprehensively substantiated recommendations on questions of job placement for those desiring to continue working after reaching retirement age. Medical services to working retirees and full dispensary coverage for them should also be improved and ensured.

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The government has established a number of benefits ensuring material interest in continuing labor activity after reaching retirement age. The maximum benefits are outlined for workers. Along with this, it is necessary to make broader use of various forms of moral incentives for retirees working successfully at enterprises, to propagandize their experience, a matter to which insufficient attention is being paid at present.

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#### Substantiating Administrative Staff Size

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 8, Aug 79 pp 162-166

[Article by G. F. Geller, chief economist at the "Dzhetysu" footwear production association in Alma-Ata: "How Many Engineers Are Needed?"]

[Text] It is customarily thought that the effectiveness of the labor of engineering and technical workers on improving production management is approximately proportional to the number of workers in this category. Is this assumption true?

Today, the staffs of many enterprises (and associations in particular) include various kinds of new services: computer centers, data departments, quality control departments, departments for studying demand and promising developments, economic analysis departments, and so on. This is occurring both on the initiative of the enterprises themselves and also on the initiative of superior organizations. All instructions and recommendations regarding this point out that such services must be created within the labor plans established by the enterprise. Of course, the ministries and departments do not increase enterprise allocation limits for maintaining the administrative apparatus. Moreover, there is a reduction each year. Nonetheless, paradoxical as it might seem, the number of workers employed in the area of production management (see Table) is growing year by year in industry (of union-republic subordination, let's say, in the Kazakh SSR, as in other republics as well, incidentally).

#### Growth in Number of People Employed in Production Management in Kazakh SSR Industry

	number of engineering and technical workers and employees per 1,000 workers		
	1970	1975	1977
average	140	148	151
including:			
in light industry	106	108	107
in food industry	130	143	145
in local industry	126	134	130
in building materials industry	138	144	147
in nonferrous metallurgy	140	138	137

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Let's ask ourselves if this kind of growth is justified in all instances.

If an enterprise, shop or sector has not met a monthly or quarterly plan or has not provided the planned grade of quality, it is clear that the director, chief engineer, shop chief, sector foreman or technical control department chief has permitted serious oversights in the work. But what about those who do not directly supervise a specific production sector, but who participate in management, who advise, supply, plan, keep accounts, forecast, inspect, inform, design, and so forth, whose personal influence on the course and effectiveness of production is considered only very approximately? The fact is that, let's say L., chief of the first shop, has not coped with the monthly assignment and that both Mariya Pavlovna from the production-dispatching department and Pavel Petrovich from the supply department and Lyubov' Georgiyevna from the personnel department and Gosha from the computer center and Lyudochka from the technical information bureau are to blame. But these workers are directed, each along his own line, as they say, by the third, thirteenth and twenty-fourth shops, which have successfully coped with plan fulfillment. But in accordance with the standard for evaluating the quality of a worker's labor in the plant administration, a reduced coefficient is "triggered," and the bonus for those workers will be five percentage points less.

A worker's labor is often evaluated this way.

"Try, Pavel Petrovich!" But not everything depends on him. He is sent assembly components -- "You get [the bonus]"; he is not sent them -- "You don't get it...." He sent telegrams to all the suppliers, called them up.... He is not to blame! Request that he be given the full bonus! "No objection!"

I assure you, hardly anyone would object to such a decision by a director. But we, the coworkers of Pavel Petrovich, senior engineer of a hardware group in the supply department, are well-aware that he spent two hours discussing yesterday's soccer match and an hour talking on the phone with his friend Igor' at some institute, and that had he worked all the time he was supposed to have, the parts would most likely have been there. Imagine that all the parts had arrived, that there was no gap due to Pavel Petrovich. All the same, Pavel Petrovich spent three hours each day on things unrelated to his direct duties, as if nothing were wrong.

An exaggeration, but I am reminded of the brilliant and malevolent reprise by A. Raykin in which the hero comes to the conclusion that it is more advantageous for the state that he not come to work and that the wage simply be brought to him at home twice a month, because he only fouls things up.... I suspect it's not a matter of the personal attributes of the "hero" so much as of his having been put in a situation in which there was actually nothing for him to do and that his presence on the job would mean losses.

Let the psychologists wrack their brains as much as they like about why one worker copes with his duties and has a significant impact on production effectiveness while another does not. It is unquestionably related to the personal attributes of the worker, to his knowledge, ability, skill and experience. But the answer to this question must be sought first in how precisely and well-founded his duties and rights and the system of his functional ties with those with whom he works are designated and defined.

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A position is approved. I doubt that anyone has thought about what amount of work (although purely speculatively) must be "packed" into that position. And unfounded are the arguments of some colleagues that everything depends, they say, on the person himself: if he wants to, he will always find something to do. But there is another rule: "A worker will work effectively when he has been put in a situation in which he has no opportunity to work ineffectively."

The comprehensive quality control system based on enterprise standards, the "Pul'sar" system introduced at one time in L'vov and now used everywhere -- this all influences the effectiveness of the activity of workers whose labor can be taken into account only in terms of the amount of time they spend at their workplaces, of course.

But the problem, I think, lies elsewhere. The staff size in structural subdivisions of the plant administration and shop administrations is generally determined based on recommended or mandatory staff norms worked out by superior organizations, and the list of positions and salaries is fixed on the basis of single salary plans approved by the State Committee for Labor and Social Questions, and neither the director nor the minister has the right to change it.

Let's say it becomes necessary to create a quality control department. It is known that the department can be created with a minimum of five persons. The enterprise leaders are convinced that there would be nothing for five workers to do in the department, but nonetheless the department is created and staffed as recommended.

Let's say it is established that 6-7 people must work in the technical department of the "Dzhetysu" association, depending on the amount of output in conventional pairs and the number of people working in footwear industry. But why 6-7, rather than five, or 11? What of the fact that the association includes a centralized procurement and layout factory located 30 km from the lead enterprise; all four branches comprising it are assembly factories, but one located in another oblast, in Taldy-Kurgana, has a finished production cycle? These unionwide norms fail to take the features of specific enterprises into account.

Engineering and technical worker staff norms are worked out without consideration of time expenditures of each worker comprising a given department on carrying out his duties. However, a labor plan is established for the enterprise on the basis of these norms. It is just such strict regulation of the numbers and salaries which leads to enterprises being at times forced to support additional workers for the sake of filling in some gap in the system of production management.

The Shchekino method would seem to offer enterprises a way out. The appropriate directive documents indicate that a specific group of workers can be paid an additional 30 percent of their salaries for exceeding the amount of work done and combining duties. However, such additional payments can be

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made permanent, rather than temporary, only when the plant or factory is included in the list of enterprises transferred to the Shchekino method. But we are already recognizing difficulties of an organizational and economic nature which promote enterprise disinterest in introducing the Shchekino method and which in the end influence the solution of the problem being discussed.

Certain government documents from 1972-1974 precisely define the positions and salary plans. Directors are given the right to set maximum and minimum salaries for specific workers. But in practice, salary amounts fluctuate near the average. Does such an approach provide opportunities for establishing equal payment for equal labor? It would seem not.

The solution to the problem should probably be sought in granting production associations and enterprises the right, within a fixed wage fund and a limit on allocations to support the management apparatus, to determine themselves the structure and size of administrative departments and services, using the wage fund freed to establish additional payments in amounts not exceeding 50 percent of the salary, regardless of whether that enterprise has been transferred to the Shchekino method.

Then, instead of, let's say, seven people in the technical department or 11 in the planning department, there would be five and eight, respectively (in conformity with the predetermined labor-intensiveness of the work being done and the load on each person). This would enable enterprises to choose personnel more flexibly, to have services and departments in which there would be no "excess" people, to make maximum use of the specialist's working time, to increase his material interest in the results of his own labor, and to reduce the number of personnel. Moreover, and of not inconsiderable importance at all, a more skilled specialist who, given full use of working time, could alone do what is today being done by two specialists with monthly wages totalling 230 rubles could be chosen for 160 rubles (rather than 115).

It would be difficult to overestimate the psychological aspect of such a solution to the problem: in combination with KSUKP [not further identified], such a system of wages would facilitate developing among many workers a genuine sense of responsibility for the quality of the work they do, for the effectiveness of their labor, as measured not only by the time spent at work.

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TRANSPORTATION

SOVIET RAIL SYSTEM, 1970-1980

Paris Center for Studies of International Prospects and Data (CEPII) in French May 79 pp 1-18

[Text] Introduction

The territorial extent of the USSR and the favored development of heavy industry, particularly in the western regions, have always placed upon Soviet transport a strain which is not experienced in most developed countries. And, considering the continental size of the country as well as the importance which east-west connections have assumed, the railroads, of all modes of transport, constitute the mode upon which the strain is the greatest. To be convinced of that it is only necessary to remember that over less than 15 percent of the total world network, Soviet railroad men move almost 40 percent of the total world freight traffic. Although comparison of these two figures enable the "productivity" of this network to be appraised, it also emphasizes its saturation, and consequently its fragility.

The increase in traffic is certainly a necessary cost in economic development. But that cost is justified only if it makes possible at least a proportionate improvement of the economy's qualitative and quantitative performance. But, in the USSR of the 1970 decade, as far as rail transport is concerned no such relationship is observed. To combat such a development the responsible economic officials were then forced to limit the growth in traffic for the 10th Plan. They accomplished that in 1976 and 1977 but at the cost of some disruption. The question for the future is, therefore, whether, caught between excessive increases in costs and disruption, they will be able to stabilize rail transport in satisfactory fashion.

A. The Portion of Development Costs Represented by Rail Transport Trending Constantly Higher

1. The development of the Soviet economy has been taking place, since the beginning of the 1970 decade, at the price of an excessive increase in transport expenses. Thus, the growth in net tangible product has been

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accompanied by a more than proportionate increase in freight movements necessary for development. The tables, 1 and 1A show that the number of kilometer-tons per unit of product has risen constantly since the 5-year period of the reform; according to the authors of the 10th Plan this trend should continue.\*

Table 1

## Traffic Intensity of the Net Tangible Product (PMN)

	Net tangible product (billion of rubles) constant prices	Traffic (billions of kilometer-tons)	Traffic/PMN
1960	141.0	1,885.7	13.37
1965	193.5	2,764.0	14.28
1970	281.0	3,829.2	13.63
1975	370.2	5,200.8	14.05
1980 (plan)	466.5	6,761.0	14.49

Table 1A

## Incremental "Traffic Intensity" of the Net Tangible Product

	Growth of PMN (billions of rubles)	Traffic growth (billions of kilometer-tons)	Traffic/PMN
1961-1965	52.5	878.3	16.79
1966-1970	87.5	1,065.2	12.17
1971-1975	89.2	1,371.6	15.38
1976-1980 (plan)	96.3	1,560.2	16.20

Source: NAROONOE KHOZJOJSTVO SSSR, Za 60 let. pp 389, 485

The indicator used certainly is not a true measure of the effectiveness of the Soviet transport network. However, it does suffice to indicate that improvement in its operating conditions has become an imperative necessity under penalty of otherwise seeing that sector burden the whole of the economy more than the profits it provides.

\* Despite some decreased efficiency in rail transport foreseen in 1976-1980 this method of transport remains the most important, V. Biriukov, "Transport in the USSR," COMMERCE ET COOPERATION, No 65, June 1977, p 45

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2. This pessimistic diagnosis is confirmed by the somewhat rare data which are available: these show, in particular, that the aggregate costs of transport operation with respect to the net tangible product have also constantly increased (Table 2). Thus, it appears that unit cost reductions per kilometer-ton do not offset the increase in traffic. In addition Table 2 shows that all modes of transport participate in the general cost increases. It emphasizes, however, the special role played in this evolution by rail transport: during the 1971-1975 period rail transport expenses per 100 additional units of product almost doubled with respect to the preceding 5-year period.\*

Table 2

Portion Represented by Transport Costs in the Tangible Net Products (PMN)  
(in percent)

	Total Cost /PMN			Cost increment /PMN increment	
	1965	1970	1975	1966-1970	1971-1975
Rail	2.42	2.08	2.17	1.33	2.45
Sea	0.28	0.34	0.39	0.49	0.56
River	0.17	0.15	0.16	0.12	0.17
Highway	<u>4.52</u>	<u>4.50</u>	<u>4.62</u>	<u>4.44</u>	<u>5.01</u>
Total	7.39	7.07	7.34	6.38	8.19

Notes: 1. Cost (Sebestoimost') consists of production expenses: salaries, fuel, materials, electric power, repairs, amortization, general expenses (maintenance, lighting, heating premises, etc.).

2. Cost of rail transport includes expenses of maintaining the right of way; such is not the case for the other modes of transport.

3. Transport by pipe could not be considered because of lack of data for the entire period. In 1970 the cost of this transport mode represented 0.09 percent of the PMN.

Source: Established on the basis of data given in NARODNOE KHOZJOJSTVO SSSR, Vol 1975g, p 459. Significantly, the yearbooks for 60th year and 1977 do not contain this heading.

3. It was endeavored to particularize the principal causes of the growth in costs for each transport mode (Table 3). Three causes were found: the increased volume of freight transported, the increase in the average distance traveled by each ton of freight,\*\* and productivity. This last

\* The year to year evolution is regular. Therefore the poor results for the period cannot be blamed solely upon the small growth of the PMN in 1975.

\*\* Traffic, of course, is the product of freight volume and the average distance traveled.

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is obtained by the difference in actually observed costs and the costs normally expected by virtue of the increased traffic alone.

The important part played by highway transport in the increased total costs of the sector will surely be noted; this mode of transport, as everywhere else, is the most expensive.\* But, from a more qualitative viewpoint, it will be seen, particularly, that it is the only one to have in part compensated by improved productivity for increased traffic.\*\* In contrast, the other three modes of transport have seen their productivity deteriorate. That is most particularly the case for rail transport, where the increase in "other elements" of cost is added to the expenses related to traffic. Thus, the increase in freight volume, combined with lengthening of the average distance traveled by products transported by rail, resulted in a more than proportionate increase in costs. This three-fold growth emphasizes the degree of saturation of the Soviet rail network which is specialized for moving heavy products over long distances (industrial raw materials and basic agricultural products).

Table 3

Breakdown Into Elements of the Increase in Costs of the Various Modes of Transport  
(millions of rubles)

	Rail		Sea		River		Highway		Total	
	1966-1970	1971-1975	1966-1970	1971-1975	1966-1970	1971-1975	1966-1970	1971-1975	1966-1970	1971-1975
Increase in freight volume	+932	+1,460	+191	+225	+105	+140	+3,183	+5,525	+4,411	+7,350
Increase in average distance transported	+374	+ 274	+178	-108	- 10	- 23	+1,565	+1,173	+2,107	+1,316
Other elements (productivity)	-150	+ 446	+ 53	+383	+ 12	+ 31	- 878	-2,240	- 963	-1,380
Total	+1,156	+2,180	+442 [sic]	+500	+107	+148	+3,870	+4,458	+5,555	+7,286

Source: Same as Table 2.

\* A little more than 5 kopecks per kilometer-ton, versus 0.25 for rail, 0.02 for maritime, and 0.026 for river transport.

\*\* It would have been desirable to make the data more homogeneous, either by excluding right of way maintenance for the railroads or including it for the other transport modes (see Note 2 for Table 2). But it is probable that the evolutions would have been practically the same.

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## B. The Difficulties of the Early Years of the 10th Plan

4. Faced with this situation the authors of the 10th Five-Year Plan provided for decreased freight traffic: its average annual growth is to go from 6.3 percent between 1971 and 1975 down to 5.3 percent from 1976 to 1980. This decrease is undoubtedly not unrelated to that of the net tangible product; without being the only factor, the transport limitation probably played a role in the limitation of the growth prospects for the Soviet economy. The decrease in rail traffic growth is to be still more marked, going from 5.4 percent per year between 1971 and 1975 to 4 percent between 1976 and 1980.

As a matter of fact traffic, especially rail traffic, increased in 1976 and 1977 much less rapidly than the planners expected (Table 4): 4.4 percent in 1976 and 3.7 percent in 1977 for the total and 1.8 percent and 1 percent for rail traffic.

Table 4

Annual Freight Traffic Plan and Performance by Transport Mode  
(billions of kilometer-tons)

	1975	1976		1977		1978
	Performance	Plan	Performance	Plan	Performance	Plan
Rail	3,237	3,325	3,295	3,440*	3,330	3,403
Sea	736	no data	762	824	769	833
River	222	235	223	240*	231	241
Highway	338	no data	355	385	380	406
Pipeline	666	772	795	896	922	1,047
Total	5,199	no data	5,430	5,785	5,632	5,930

\* These data are shown in the 60th yearbook, V. Biriukov, in the article cited below, states the objectives for 1977: 3,375 for rail transport and 230 for river transport.

Sources: 1) EKONOMICHESKAYA GAZETA, No 5, January 1977, p 5  
2) V. Biriukov, "Transport: Itogi i Perspektivy,"  
PLANOVOE KHOZJAJSTVO, No 2, 1978  
3) NARODNOE KHOZJAJSTVO SSSR, Za 60 let, Moscow, 1977, p 389

These results may have appeared satisfactory since they translate into a reduction of the traffic intensity in the growth. However, they could have been more so if they had not been accompanied by deceleration, also unplanned, in the product growth. Above all, they must be closely related to the contrary performance recorded in some sectors such as iron and steel, non-ferrous metallurgy, chemical industry (most particularly, fertilizers), and building materials (especially cement) whose raw material supplies are highly dependent upon rail transport. Even though there had been

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rationalization of the traffic flow, that was in fact accompanied by disruption of the rail transport system and, in certain cases, by failure of supply. The confusion manifested, notably in 1977, within the responsible ministries and state committees, bears witness.

5. As usual, a resolution adopted by the party Central Committee and the Council of Ministers reveals the anxieties and put the administrations on notice.\* Since then the sector has been under special "surveillance" and deficiencies observed in its operations regularly reported in the press. Each minister called to account then tries to absolve himself and place the blame for his difficulties upon others. Thus, for example, one of the vice chairmen of GOSPLAN [State Planning Commission] blames the Ministry of Communication Lines for deficiencies in operation and maintenance of rolling stock; then the ministries of Nonferrous Metallurgy, Chemical Industry and Construction Materials for excessive demurrage of the equipment they utilize.\*\* The minister of wood processing industries, also a subject of criticism, defends himself for the small quantity of raw timber shipments by pointing out that the Ministry of Communication Lines made available only 50 percent of the number of freight cars planned. The target of these converging criticisms points out, in response, that the cars it sends are often loaded to only half their capacity and, in addition, are returned to it in poor condition. At the same time it draws attention to the poor quality of the rolling stock supplied to it by the Ministry of Heavy Mechanical Construction and Transport Facilities...\*\*\*From place to place the shock wave is thus transmitted to all the administrations, coming down, moreover, to hit the planners.\*\*\*\*

6. On the basis of this example of the operation of the administered economy one should not attempt to make an exact distribution of the responsibilities. Basically, what the various criticisms and reactions reveal are the traditional defects in the sector generally designated "productivity reserves": slowness in freight transfer causing excessive demurrage of rolling stock; insufficient attention devoted to utilization of cars, the source of rapid equipment deterioration and of cargo losses; irrational freight movement; technical deficiencies of equipment; and so forth. These "reserves," specific to transport, are the result of customary behavior in the Soviet system where excessive centralization and "sectorization" cause a dilution of responsibilities in the economic-administrative fabric, notably in "horizontal" activities. Besides, they are in large part the result of administration which for a long time has subordinated the tariff system and direction of movements to a policy of territorial development itself in large part depending upon non-economic considerations.

\* "On Measures for Development of Rail Transport in the years 1976-1980," January 1977.

\*\* V. Biriukov article cited, Biriukov, recently promoted to be one of the vice chairmen, formerly occupied the position of official in charge of the "transports" department of GOSPLAN.

\*\*\* PRAVDA, 15 August 1977, p 2.

\*\*\*\*PRAVDA, 27 December 1977, p 2.

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In truth these "systemic" defects cannot be considered the immediate and direct causes of the recent disillusion. The Soviet economy is accustomed to operate with its mode of organization taken into account. When difficulties do appear it is appropriate to attribute them to more specific additional factors. These are what must be made clear in order to learn whether the present recorded difficult state of affairs is capable of being resolved or whether they may be the basis for thorough questioning of the sector's operating principles.

C. Direct Causes of the Difficulties

7. The inadequacy of investments in rail transport throughout the entire period of the 9th Five-Year Plan, which follows upon a relative lack of attention spread over many years, explains for one part of the sector's difficulties (Table 5).

This very distinct "lack of interest" with respect to resources allocated to rail transport could perhaps be justified if it had been accompanied by an appreciable reduction in investment expenditures for construction of new lines. As a matter of fact the rail network managed by the Ministry of Communication Lines has not ceased to grow, even though a slowdown in the growth is observed: 3,800 kilometers between 1965 and 1970 and 3,100 kilometers between 1970 and 1975. And if it is taken into consideration that a number of new lines were built in regions the most difficult of access, notably in Siberia, it must be inferred (without, however, having the support of precise data) that investments devoted to improved operation of the network probably received less and less attention. Under these conditions it can be better understood why the officials responsible for the Soviet economy wanted to see a slowdown in traffic growth.

8. The instructions given in all probability to agencies concerned with rail transport--the railroad men themselves, and also the State Commission for Supply (GOSSNAB), as well as consignees and suppliers--in any case seem to have been closely followed, no doubt that is what most directly explains the 1976 and 1977 evolutions. Everything in fact occurred as if, taking into account the indications provided by the planners and the resources at their disposal, the plan executants had been compelled at all costs to limit traffic growth, both in freight volume and in distance travelled. In sum, the respecting of central directives, rational in their objectives, resulted in abrupt changes in set habits, apparently positive, but in fact very disruptive.

The disruption is more particularly marked as far as volume of freight transported is concerned: on the average the annual increase was reduced by about two-thirds in comparison with the years of the 9th five-year period, and every category of product was affected.\* This phenomenon

\* For grains, the 1976 and 1977 evolution only partly followed the general rule. There transport irregularities mean ready money and are dependent upon production fluctuations.



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Table 5  
Investment in Rail Transport, 1950-1976

	1951- 1955	1956- 1960	1961- 1965	1966- 1970	1971- 1975	1971	1972	1973	1974	1975	1976
Portion of total investments (in %)	4.9	3.4	3.2	2.7	2.6	2.8	2.7	2.6	2.5	2.6	2.6
Portion of in- vestments in transports (in %)	54.4	39.5	33.3	29.3	25.2	29.1	26.4	24.7	23.5	24.0	23.6

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cannot be linked solely to the slow down recorded in the production domain; as a matter of fact, for each main product category the ratio between volume of rail freight and that of production, which had tended to increase in 1975, stabilized or decreased in 1976 and 1977.\*

Table 6

Annual Growth in Freight Volume, 1971-1977 (millions of tons)

	1971	1972	1973	1974	1975	1976	1977
Coal	+22.6	+15.7	+20.1	+25.0	+19.6	+13.4	+ 8.8
Petroleum products	+20.0	+17.6	+20.1	+18.8	+ 9.7	+ 5.4	+11.9
Building materials	+62.2	+50.0	+52.8	+57.7	+33.1	- 5.7	+19.0
Wool products	+ 5.9	- 5.0	+ 5.5	- 1.5	+ 3.3	-13.8	- 4.9
Ferrous metals	+ 0.4	+ 6.1	+ 8.5	+12.5	+ 8.9	+ 7.0	- 5.0
Ores	+ 9.9	+13.3	+13.6	+11.1	+14.4	+ 8.3	+ 2.9
Grains	+ 3.6	+ 3.6	+15.6	- 7.0	+ 0.1	+ 8.1	- 3.3
Fertilizers	+ 5.0	+ 4.7	+ 7.5	+ 4.1	+ 9.9	+ 1.6	+ 4.7
Total	129.6	+106.0	+143.7	+134.7	+99.9	+24.3	+38.6

This deceleration in freight growth, greater than would normally have resulted from the general slowdown in economic activity, showed up, as has been said, in supply failures. The transport of wood products seems to have suffered particularly: this sector in fact is the one against which the strongest criticisms have been leveled. But the problems in supplies of coal, iron, building materials, and fertilizers have also been cited several times. For the year 1977 alone, and just in the central daily press, there are no fewer than 30 items by journalists or by representatives of the administration relating to operation of rail transport.\*\*

Table 7 summarizes observed evolutions in the average distance traveled by transported freight. As will be seen, the disruption in comparison with the years 1971-1975 is also very clear: the average distance for the greater portion of products either decreased or was stabilized. For only two products, coal\*\*\* and fertilizers, did it continue to increase.

\* For petroleum products and fertilizers the freight/production ratio had already decreased previously. This trend was confirmed in 1976 and 1977; for fertilizers it even accelerated in 1977.

\*\* The Current Digest of the Soviet Press, Vol 29

\*\*\* In the case of this product, one may relate the evolution (due essentially to the year 1976) with information revealing failure of supplies at the Kuznets plant, which were made up by deliveries coming from Kuzbass, more than 1,800 kilometers away (the average distance traveled by a ton of coal is about 700 kilometers).

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Table 7

Evolution of Distances, 1971-1975 and 1976-1977 (in kilometers)

	1971-1975	1976-1977
Coal	+ 3	+51
Petroleum products	+69	-47
Building materials	+31	0
Wood products	- 1	0
Ferrous metals	+54	- 9
Ores	+64	-19
Grains	+99	-50
Fertilizers	+58	+17

It therefore seems that the restrictions affected the longest freight flows. The "rationalization" was then concretely translated into changes in geographical and sectorial assignment of cars needed for transport, from which the products traveling the longest distances, such as wood and ores, most particularly had to suffer. And these changes have made evident, more than usually, the traditional deficiencies (slowness of transloading operations, light loading of rolling stock, lack of proper care in using such equipment and so forth).

9. The next few years will tell whether these 1976 and 1977 evolutions in volume of freight and distances traveled will stabilize and be lastingly entered in economic activity.

If such be the case, that is, if the difficulties arising from the disruptions of the early years of the 10th Plan are progressively resolved, the operation should undoubtedly have been salutary, at least for a time. This will in fact signify that the rationalization of the flow of freight, even though [artificial] in its beginnings, will have corresponded with positive changes in location of production centers of raw materials and transformation centers. This will also mean that the utilization structure of the transport modes will make it possible to slacken somewhat the constraints which weigh upon the rail network.\* The latter can then pursue its activity upon a healthier basis.

If such be not the case, then the slowdown in traffic growth will have been only artificial and continued economic development of the USSR will require traffic to resume the trajectory of the 9th Five-Year Plan. The Soviet authorities will continue to be threatened by the alternative reefs of rise in traffic intensity or disruption of activity. This two-pronged threat would then assuredly constrain them to undertake more profound

\* It will be noted that this phenomenon is already playing a part in petroleum products transport, for the benefit of oil pipelines.

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reforms, which, by the way, will not be limited solely to rail transport, nor even to the transport sector alone.

Here and now the Soviet leaders, in announcing the preparation of a plan for improving rail transport on the 1990 horizon,\* have recognized that they will not have the time for deep reflection, over the long term, upon this sector, and that the difficulties of 1976 and 1977 are not but temporary. Such reflection will no doubt lead to definition of a policy of more favorable investments. Will they go so far as to decide upon "substantial changes in the status of the railroads" which "the interests of the economy require"\*\*, and which would push in the generally desired direction of greater centralization of the management of the sector's activities? Or even, more ambitiously, will they seek to design an economic mechanism which will induce producers, railroad men, and users to reduce transport expenses?\*\*\*

It is certainly not appropriate to extrapolate from these or those thoughts of a journalist or oblast economist (in this instance, N. Vassiliev of Sverdlovsk), however close they may be to the logical propositions which analysis of the sector's activities allows to be formulated. It will be noted at the very least that when the thoughts concern a sector as crucial as transport, situated at the very heart of industrial activity and, in addition, when they are added to those to which the difficulties of other sectors give rise, they take on special significance.

Last, it will be observed that the progressive rise of transport among the "priority" sectors of the future confirms the hypotheses which have been formulated about the modes of Soviet growth in the 1980 decade,\*\*\*\* According to these the recurring appearance of bottlenecks will in large part contribute to maintaining Soviet economic activity at a low level.

\* IZVESTIJA, 26 July 1978, p 2.

\*\* PRAVDA, 30 December 1977, p 3.

\*\*\* IZVESTIJA, 20 December 1977, p 2.

\*\*\*\* "Prospects for the Soviet Economy, 1977-1985: Points for Reflection," CEPPII, September 1977.

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## TRANSPORTATION

### GRAIN RAIL TRANSPORT, FLOW OF GRAIN TRACED

Moscow EKONOMICHESKAYA GEOGRAFIYA TRANSPORTA SSSR, [Economic Geography of Transport of USSR] in Russian 1977 pp 201-203

[Excerpt of book by S. K. Danilov, Izdatel'stvo "Transport," sections 48, 49]

[Excerpt] Ninety-three percent of all grain cargoes is transported by the railroads. In 1975 the railroad transported 122 million tons of grain cargoes, which amounted to 3.5 percent of all the haulage and 4.4 percent of all the freight turnover by the railroad transport. Six percent of all grain cargoes is transported on the rivers. Grain cargo haulage is notably seasonal.

The bulk of grain transport takes place in September and October. The average haulage distance of grain cargo by rail, 1234 km, significantly exceeds the railroad network average. It has grown over the past 20 years as a result of the increase in the area under cultivation in the eastern regions of the country. Conversely, the haulage distance for products of milling was lowered because of the construction of large flour-milling and groats enterprises in areas of consumption.

The greatest shipment of grain for export takes place on the following railroad systems: the Kazakh, Western Siberian, Southern Ural, Volga, Kuybyshev Northern Caucasus, South-Eastern, Dneprovsk, Southern, South-Western, and Odessa-Kishinev. More than 75% of rail network grain haulage takes place on these railroad systems. The Moscow, Gor'kiy, Northern, Northern Caucasus, South-Eastern, Kuybyshev, Volga, Sverdlovsky, and Southern Ural railroad systems ship the greatest quantity of milled products. A significant quantity of grain cargoes arrives at the L'vov (Chop, Mostiska), Belorussian (Brest), October (Leningrad), Baltic (Riga), Odessa-Kishinev (Odessa, Kherson, Nikolayev), and Northern Caucasus (Novorossiysk) railroad systems.

### Grain Cargo Flows

The flow of Siberian grain, continuously increasing, proceeds from Novosibirsk to Sverdlovsk, where it divides: One part goes through

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Perm' to Leningrad, and the other goes through Kazan' to Moscow. Siberian, Ural, and Kazakh grain arrives in Moscow through Chelyabinsk--Kuybyshev--Syzran'--Ruzayevka--Ryazan'--Moscow. Part of this grain is trans-shipped to the Volga at Kuybyshev and Tol'yatti and follows the river to Gor'kiy, Yaroslavl', and Kalinin. The flow of grain from the Volga, from Saratov and Kamyshin also proceeds to Moscow, through Michurinsk.

The flow of grain from the Northern Caucasus proceeds from Prokhladnaya through Rostov--Likhaya--Voronezh to Moscow. Another part proceeds from Rostov through Martsevo--Nikitovka--Krasnyy Liman--Khar'kov. Grain also arrives here from the Crimea: Dzhankoya--Lozovoy. The flow is divided at Khar'kov--through Kursk--Tula to Moscow, through L'gov and Vorozhba to Leningrad, through Bakhmach to Minsk--Vil'nyus, from the divergence of the flow at Riga and Kaliningrad. The flow also proceeds in a southeastern direction, from Prokhladnaya to Baku and Tbilisi. The flow of grain goes through Krasnodar to Novorossiysk for export.

Grain from Novosibirsk makes its way to the East--to Eastern Siberia and the Far East--and to the South, to Barnaul--Semipalatinsk--Berlik--Arys'--Central Asia. The Tselinograd--Mointy--Berlik--Arys' and Iletsk--Aral Sea--Arys' flows also arrive at Arys' station.

The basins of the Volga, Kama and Don, and also the Dnepr', Ob', Irtysh, and Yenisei are most important in the transport of grain cargoes along the waterways. Grain from the Northern Caucasus, which has been delivered by the Tikhoretskaya-Volgograd railroad, is transported on the Volga. The freight flows of grain from the regions, which gravitate toward the Don, are directed toward the Volga along the Volga-Don Canal, with transshipment to river transport at Rostov and Volgograd. Transshipment of train to the Volga also occurs at Sarapul, Kuybyshev, Tol'yatti, Balakov, Kamyshin, and Volgograd. After transshipment, the flow of grain cargoes proceeds up along the Volga, increasing with the addition of grain from the area along the Volga and transshipments from the railroad systems, principally from the eastern regions of the country. The grain proceeds to the regions of the Center, the Northwest, and the Middle and Upper Volga, to the largest flour-milling enterprises of Moscow, Saratov, Syzran', Kuybyshev, Kazan', Gor'kiy, Seym, Kineshma, Yaroslavl', Rybinsk, and Kalinin. At Yaroslavl' part of the grain is loaded onto the Northern Railroad System for movement to regions of the European North. Grain cargoes are directed to Leningrad, Cherepovets, Karelia, Murmanskaya Oblast, and other areas of the Northwest, via the Volga-Baltic and Black Sea-Baltic waterways. In this region Rybinsk is the major point of transshipment from water transport.

Grain cargoes from the steppe and forest-steppe regions of the Ukraine are directed down the Dnepr' to the maritime export ports Kherson and Nikolayev (Yuzhnyy Bug River). Above, the grain proceeds via the Dnepr' to various industrial centers of the Ukraine and Belorussia. At Gomel' the grain is transloaded to the railroad and directed to the maritime export ports of the Baltic (Riga, Liyepa, Kaliningrad).

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Grain from the regions of Altayskiy Kray and Novosibirskaya Oblast are directed, via the Ob', to Barnaul and Novosibirsk for milling. Subsequently, the products of milling are transported down along the course of the Ob' to various logging, fish industry, and oil and gas extraction regions of Western Siberia.

The main bulk of the grain from Kazakhstan is transported along the Irtysh to Omsk, to the major center of the flour-milling and groats industry. From Omsk the flow of the products of milling is directed down along the course of the Irtysh, uniting with the Tyumen' flow. The main points for transshipment of grain cargoes on the Ob' are: Barnaul, Novosibirsk, Labytnangi. On the Irtysh they are: Omsk, Pavlodar, Semipalatinsk.

The grain is transported to Krasnoyarsk for processing, from Khakasskaya autonomous oblast via the Yenisey. Grain cargoes are transported on the Angara from the regions adjacent to the Angara to Irkutsk. The major transshipment point on the Lena is the port of Osetrovo, from which Siberian grain is shipped to regions of Yakutskaya ASSR.

Grain for export is shipped mainly by means of maritime transport, through the ports of the Black and Baltic seas. Grain transport by means of coastal shipping within the confines of a single sea is insignificant-- basically it is transport in the Caspian Sea in the direction of Krasnovodsk--Baku. The major ports used in the shipment of grain to the countries of the Mediterranean basin and the Indian Ocean basin are Novorossiysk, Odessa, Kherson, Nikolayev, Izmail, and Reni. Grain cargoes are exported to the countries of Northwestern and Northern Europe through the Baltic Sea ports--Leningrad, Kaliningrad, Riga, and Liyepaya. Grain is transported to the regions of Sakhalinskaya, Kamchatskaya, and Magadan-skaya oblasts through the ports of Vladivostok, Nakhodka, and Vanino.

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